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ABSTRACT

This paper is concerned with the clarification and resolution of two basic defects of curricular and instructional research: vagueness as to what is being undertaken, and inattention to the logical aspects of evaluation. It introduces the concepts of curricular claim and instructional claim, clarifies the function and import of curricular claims, and sets forth the principles of curricular claim validation. The implications of these concepts and principles for both curricular and instructional research and educational program construction and evaluation are examined. (Authors/DDO)

THE NATURE AND SIGNIFICANCE OF CURRICULAR CLAIMS AND HOW THEY ARE VALIDATED

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INTRODUCTION.

Basic Defects in Curricular and Instructional Research

Two fundamental, and confounded, defects characterize curricular and instructional research. These deficiencies prevail in the formation and evaluation of educational programs as well.

One defect is vagueness as to the object to be constructed or evaluated. The other defect is a general blindness to the logical aspects of evaluation.

Vagueness as to the object to be built or evaluated leads to such practices as (a) formulation of vague hypotheses that are not capable of meaningful empirical test, and (b) failure to distinguish statements from the actions taken in realization of the conditions articulated by statements. Blindness to the logical aspects of evaluation results in such practices as (a) failure to take into account significant auxiliary hypotheses that are implicitly assumed to be valid, and (b) judging the validity of hypotheses on the basis of non-relevant observations.

Clarification and resolution of these two basic defects of curricular and instructional research are the concern of this paper. It should be noted that other crucial conditions of fruitful research are not taken into account here. These are examined in a more comprehensive document, A Reconstruction of the Language of Curriculum and Instruction: Curricular and

Instructional Claims and How They Are Validated [11], upon which the present paper is based.

Aim and Scope of This Paper

The purposes of this paper are to (a) introduce the concept of 'curricular claim,' (b) clarify the function and import of curricular claims, and (c) set forth the principles of curricular claim validation.

First, the structure and function of a curricular claim will be identified, and its extra-logical components described and illustrated. It will be necessary to introduce the related concept of 'instructional claim' also, and to clarify the relation between instructional claims and curricular claims.

Second, the concept of validation will be introduced. Both logical validity and factual validity will be construed as judgments about sentences based on relations between sentences. Principles and pragmatics of curricular claim validation will be set forth.

Third, implications of the concepts and principles introduced will be examined in reference to both (a) curricular and instructional research, and (b) educational program construction and evaluation.

CURRICULAR CLAIMS AND INSTRUCTIONAL CLAIMS

The Structure and Function of Curricular Claims

A curricular claim will be viewed as an hypothesis to which both teacher(s) and pupils subscribe, and under which both act. Moreover, the value orientations undergirding the statements of this paper entail subscription by teacher and pupil of their own volition.*

A curricular claim specifies a relation between some course of action, defined by a set of rules, and attainment of an intended goal-state by an individual (pupil); it also includes specification of the set of individuals for which the relation is believed to be valid.

The opportunity of independent judgment by both teacher and pupil, as to whether subscription to a proposed curricular enterprise is warranted, is rooted in the premise that education is (or ought to be) governed by the values of rationality, objectivity, and independent judgment. This premise is supported by such documents as the NEA Code of Ethics [13] and Israel Scheffler's Conditions of Knowledge ([17], p. 11), in which Professor Scheffler uses the ideal of rationality as the demarcation criterion for distinguishing teaching from such influence activities as "deception, insinuation, advertising, propaganda, indoctrination, suggestion, bribery, and force."

* *It should be noted that there is no way to avoid value judgments of the sort made here, even in introducing the concept of curricular claim.*

The condition that a curricular claim must be made in reference to an individual pupil is grounded in the ethical premise that, in the educational profession, there is an obligation to provide a service of benefit to each client (pupil) for whom professional responsibility is accepted. It would not seem reasonable to accept responsibility for a pupil, for example, where the professional (educator) has no reason to believe that his professional action has reasonable chance of being effective.

Under the preceding notions, a generalized curricular claim might be represented in this way:

Generalized Curricular Claim

For each pupil X, where X satisfies conditions C;
If both the teacher(s) and a set of pupils,
of which X is a member, act under rules R,
then X will (probably) attain goal-state S.

A curricular claim** contains both logical terms, e.g. 'if,' 'then,' and extra-logical components which are linked by the logical connectors. The extra-logical components all have empirical import, and will be labeled: *curricular goal-state*, *curricular rules*, and *curricular qualifying conditions*. Simple examples of these extra-logical components are displayed within the context of the illustrative curricular claim in Figure 1.

** *It should be noted that the expresstion 'curricular claim,' as used he. :, denotes a proposition; i.e. a statement which can be judged true or false. The 'generalized curricular claim,' however, is a proposition generator, i.e. a curricular claim generator, but itself cannot be judged true or false.*

Figure 1

AN ILLUSTRATIVE CURRICULAR CLAIM

For each pupil X, where X satisfies these qualifying conditions:

C[1]: X is characterized by adequate language usage in reference to its semantic, syntactic, and pragmatic aspects;

C[2]: X is characterized by comprehension of the principles of deductive and inductive logic;

C[3]: X places high values on rationality, objectivity, and independent judgment;

If both the teacher for teachers and the set of pupils, of which X is a member, are under the following curriculum rules:

Substantive Rules

R[1]: "Problems of social conflict" will constitute the basic curricular units (i.e. elements);

R[2]: The set of problems will be partitioned into three disjoint subsets:

Subset A - a set of problems, each of which entails resolution of a conflict between two individuals,

Subset B - a set of problems, each of which entails resolution of a conflict between an individual and an organized group of individuals (i.e. an organization),

Subset C - a set of problems, each of which entails resolution of a conflict between two groups of individuals (i.e. between two organizations);

Regulative Rules

(Initiation Rules)

R[3]: Any participant (i.e. teacher or pupil) may propose a problem for acceptance by any pupil or group of pupils;

R[4]: Adequate resolution of some problem belonging to Subset A by a pupil is a condition of acceptance of a problem of Subset B by that pupil; and, adequate resolution of some problem of Subset B is a conditions of acceptance of a problem of Subset C.

R[5]: If a pupil and the teacher both accept a problem proposed for acceptance by that pupil, then that pupil must attempt its resolution.

(Activity Rules)

R[6]: Problem resolution as a collective (team) enterprise is permissible; where, each member of a team is independently accountable for both process and product.

R[7]: The teacher must provide critical analysis on request of any pupil; substantive guidance on the part of the teacher is permissible under the condition that the pupil has accepted a proposal of substantive guidance.

(Termination Rule)

R[8]: Efforts toward resolution of a problem by a pupil will terminate when: (a) a pupil claims that the problem is resolved, or it is impossible to resolve the problem, or it is not fruitful to attempt problem resolution under the existing circumstances; and (b) the teacher accepts the claim.

(Validation Rules)

R[9]: Any participant who makes, or accepts, a proposal or claim is obligated to clarify or validate the proposal or claim on demand of any other participant.

R[10]: All participants are obligated to validate statments and actions under the conditions of (a) rational action, (b) adequate language usage in reference to its semantic, syntactic, and pragmatic aspects, and (c) the principles of inductive and deductive logic.;

then X will (probably) attain this curricular goal-state:

- The ability to apply credible problem-solving principles in situations involving social conflict,

and

- the intention of applying those principles under circumstances where the individual makes the judgments that (a) a significant problem of social conflict exist, (b) he has both the responsibility and opportunity of contributing to resolution of the conflict, and (c) his action would have a reasonable chance of leading to problem resolution,

and

- the action pattern of consistent application of the problem-solving principles when such judgments are made.

Explication of the concepts of curricular goal-state, curricular rules, and curricular qualifying conditions follows. The reader may find that each concept will be clarified by again referring to Figure 1.

The *curricular goal-state* is represented in the form of a set of concepts or sentences (inclusive sense of 'or') which represent some desired pupil-state. This representation must have empirical import: the state of affairs denoted by the 'curricular goal-state' must, in principle, be capable of realization and of meaningful test to determine whether it has been realized.

Curricular rules are rules which govern the actions [2] of both teacher and pupil. They 'rule in' some acts and 'rule out' other acts. Still other acts (such as chewing gum) may be value-free in reference to the rules. Ordinarily, curricular rules (ought to) include a *substantive* aspect and also a *regulative* aspect.

We will construe the substantive aspect of a set of curricular rules in such a way as to include:

(a) *Identification of the basic elements, units, or parts with which the participants (i.e. teacher and pupil) will deal.* These basic units may be concepts or principles, problems, activities, aesthetic objects, etc.; and

(b) *Identification of the interrelationships among the basic elements, units, or parts with which the participants will deal.*

The regulative aspect of a set of curricular rules specifies the ways in which the teacher and pupil, or pupils,

should act in relation to each other, and in relation to the basic units of the enterprise. We will construe the regulative aspect of curricular rules in a way which includes:

(a) *Identification of the ways in which actions, in relation to the basic curricular units, will be initiated, conducted, terminated, and validated;* and

(b) *Identification of that which is obligatory, permissible, or not permissible on the part of both teacher and pupil.*

The *curricular qualifying conditions* consist of a set of propositions. These propositions describe the pupil-state assumed to be necessary to effective functioning under the curricular rules, and in reference to the curricular goal-state. Of course, the pupil must have had prior opportunity of achieving the state of affairs denoted by the qualifying conditions since judgment as to the factual validity of the propositions, in reference to each potential pupil, must be made before the curricular rules are invoked.

The extra-logical components of a curricular claim govern instructional and learning activities in much the same way that the rules of a game govern the activities of all players through the course of the game.

The rules of any game make some actions mandatory for each player, some actions permissible, some actions forbidden, and other actions value-free; on the other hand, each player is allowed some degree of freedom to determine the way in which even most mandatory acts will be performed. Consequently,

each player develops an individual strategy that guides the way he performs individual acts during the course of the game. Moreover, each player characteristically changes his strategies in response to the acts of opposing players. These strategies must conform to the rules of the game and, of course, have the purpose of achieving the goal of the game.

In an analogous way, curricular rules make some actions obligatory on the part of the pupil or teacher, while making some actions permissible, some actions not permissible, and other actions value-free in reference to the rules. The curricular rules leave both teacher and pupil some degree of freedom to determine the way in which their individual acts will be performed. The teacher develops strategies for influencing the pupil toward goal-state attainment, and adapts these strategies in response to the patterns of individual pupil acts. The pupil, deliberately or otherwise, forms strategies which guide his individual acts toward goal-attainment, and adapts these strategies in response to the patterns of individual teacher acts.

It is important to recall that we are viewing education as a cooperative enterprise where both teacher(s) and pupils have subscribed, of their own volition, to the same curricular rules and goal-state. Both teacher strategies and pupil strategies, as well as their individual acts, must conform to the common rules.

Of course a given strategy is reasonable only if its user believes that, under the existing circumstances, implementation of that strategy will lead to achievement of certain ends. Moreover, within the professional context, a teacher's strategy is justified only when it is imbedded within the rule component of some claim that the teacher has reason to believe is valid. This sort of a claim will be called an *instructional claim*.

The Structure and Function of Instructional Claims

The concept of *instructional claim* is introduced at this point for two reasons. First, instructional claims are instrumental to realization of the various conditions imbedded within a curricular claim. Second, the concept of instructional claim is crucial to curricular claim validation.

Both teacher and pupil subscribe to, and act under, a curricular claim. But, only the teacher subscribes to, and acts under, an instructional claim.

A generalized instructional claim might be represented in this way:

Generalized Instructional Claim

For each pupil X, where X satisfies conditions I,
If the teacher(s) acts under rules T, in relation
to a set of pupils of which X is a member,
then X will (probably) attain goal-state G.

The extra-logical components of an instructional claim will be called: *instructional goal-state, instructional rules,*

and *instructional qualifying conditions*. Each of these components will be illustrated within the context of the sample instructional claim displayed in Figure 2.

The *instructional goal-state* can be articulated in the form of a set of concepts or sentences (inclusive sense of 'or') which represent some desired state of affairs in reference to the pupil. The instructional goal-state can be synonomous to the curricular goal-state, logically or ethically necessary to attainment of the curricular goal-state, or empirically useful to attainment of the curricular goal-state.

Instructional rules are represented as a set of rule-statements which determine each individual act that the teacher will perform in every acting-situation expected to occur. Instructional rules constitute a plan, or a set of procedures, formulated for the purpose of guiding teacher actions. The teacher is free to modify, or replace entirely, any set of instructional rules under which he intends to act. However, neither the instructional rules nor consequent teacher acts may violate the curricular rules to which both teacher and pupil have subscribed. Otherwise, realization of rationality would be thwarted; and, empirical test of curricular claims could not be achieved.

The *instructional qualifying conditions* consist of a set of propositions describing the existing state of a pupil. The pupil-state is described in reference to (a) the curricular

Figure 2

AN ILLUSTRATIVE INSTRUCTIONAL CLAIM

For each pupil X, where X satisfies these instructional qualifying conditions:

I[1]: X comprehends the basic problem-solving paradigm,

I[2]: X is deliberately aware of, and can utilize, credible sources of both causal and teleological explanations of human behavior,

I[3]: X has adequately resolved at least one problem of Subset A;

If the teacher(s) acts under these rules in reference to a pupil subset of which X is a member:

T[1]: The teacher (T) will propose that the pupil subset, including X, assume the responsibility of identifying, and proposing for resolution, a problem of practical concern to each pupil of the subset; and, where resolution of a conflict between an individual and a group of organized individuals (i.e. organization) is entailed.

T[2]: If the responsibility is accepted by each pupil of the subset, then T will follow these rules:

(a) T will initiate no moves relative to the problem identification, or subsequent resolution, efforts of the pupil subset;

(b) On any occasion that any pupil, or pupils, of the subset claims that (1) some step or steps toward identification or resolution of a significant problem have been adequately performed, or (2) the problem has been adequately identified or resolved, then T will demand justification of the claim; and, if T perceives that the justification in not adequate, then T will illuminate the defect by the Socratic method;

(c) If any pupil, or pupils, of the subset requests guidance as to what moves to make or how to make them, then T will either (1) suggest potentially useful information sources, or (2) provide explanation or illustration in a manner that minimizes synthesis by T and maximizes synthesis by the pupil or pupils.

T[3]: If the pupil subset does not accept the proposed responsibility, then T will follow this rule:

First, T will act in a manner governed by the curricular rules in attempting to resolve the issue; and, if that fails, then T will enter the diagnosis, explanation, remediation mode for identifying and resolving unanticipated classroom problems (under the curricular rules).;

then X will (probably) attain this instructional goal-state:

- The ability to apply credible problem-solving principles in some situations involving conflict between an individual and an organized group of individuals.

rules or curricular goal-state, or (b) some instructional goal-state contained within an instructional claim which is adequate in reference to the curricular claim (or claims), or (c) individual pupil goals, strategies, or assumptions under which the pupil acts. Instructional qualifying conditions are *intra-curricular* whereas curricular qualifying conditions are *extra-curricular*.

VALIDATION OF CURRICULAR CLAIMS

The Concept of Validation

Validation is the process of making judgments of validity. Judgments of validity are judgments of sentences, and these judgments are based on relations between sentences. We are, of course, interested in making judgments of sentences of a type that we have labeled 'curricular claims.' We may be forced, indirectly, to be concerned with judgments of the validity of instructional claims as well, but this is not our primary focus on the present occasion.

Judgments as to the validity of a sentence may be judgments as to *logical validity* or judgments as to *factual validity* [5].

The principles of logic constitute grounds for determining whether one sentence (i.e. "conclusion") is a consequence of another sentence or set of sentences (i.e. premises). If the relevant principles are realized, i.e. if the conclusion is a justified deductive inference in reference to prior sentences, then the concluding sentence is judged to be *logically valid* with respect to those premises. If, under the logical principles being applied, the conclusion is demonstrably false, then the concluding sentence is judged to be *logically contravalid*. In other cases it may not be possible to make a justified judgment on the basis of logical rules alone; in this

event the concluding sentence is *logically indeterminate*.

Some sentences are called *factual propositions* ([9],pp.16-21) Factual propositions are statements that have some bearing on empirical objects or events. Factual propositions, some of which are called 'hypotheses,' must be judged on the basis of their relation with sentences which describe observations. If a factual proposition corresponds with the observation sentences, or observation reports, then that set of observation sentences is viewed as having confirmed the factual proposition to some degree. In this event, and in a very tentative sense, the proposition is judged to be *factually valid*. If the set of observation sentences does not correspond with the factual proposition, then that proposition is disconfirmed to some degree; the factual proposition is then judged tentatively to be *factually contravalid*. In reference to observation sentences which do not fulfill certain semantical conditions, it may be impossible to make a justified judgment about the factual proposition; in this case the proposition may be viewed as *factually indeterminate* in reference to those observation sentences.

Carl Hempel, in Aspects of Scientific Explanation [7] has noted that the relation between an hypothesis and relevant observation sentences is a basically semantical relation. Hempel has illustrated this relation within the following explication of the view of confirmation as a relation between sentences:

> "It is possible ... to construe confirmation ... as a relation between two sentences, one describing the given evidence, the other expressing the hypothesis. Thus, instead of saying that an object *a* which is both a raven and black (or the fact of *a* being both a raven and black) confirms the hypothesis that all ravens are black, we may say that the evidence-sentence, '*a* is a raven, and *a* is black' confirms the hypothesis-sentence ..., 'All ravens are black.' We shall adopt this conception of confirmation as a relation between sentences for the following reasons: First, the evidence adduced in support or criticism of a scientific hypothesis is always expressed in sentences, which frequently have the character of observation reports; and second, it will prove very fruitful to pursue the parallel ... between the concepts of *confirmation* and *logical consequence*. And just as in the theory of the consequence relation, i.e. in deductive logic, the premises of which a given conclusion is a consequence are construed as sentences rather than as 'facts,' so we propose to construe the data which confirm a given hypothesis as given in the form of sentences ([7],pp.21-22)."

Under the preceding perspectives, validation is construed as the process of making judgments as to the logical validity or factual validity (i.e. confirmation) of sentences. Moreover, judgments of both kinds are made on the basis of relations between sentences.

We will build our methods for validating curricular claims on these conceptual foundations.

Principles of Curricular Claim Validation

Validation of a curricular claim, as with any potentially significant hypothesis, is not merely a matter of articulating the conjecture and then immediately embarking on the mission of empirical data collection. At least, that sort of enterprise

is not likely to contribute very much to the advancement of either theoretical or practical aspects of education.

Curricular claim validation, in the sense used here, entails making a wide range of judgments of validity. These include judgments made before the claim is invoked in predictive tests of its factual validity. Such judgments are made in order to determine whether the curricular claim warrants empirical trial in the first place. Assuming that the curricular claim passes these various tests of its potential worth, it is then reasonable to submit it to empirical tests of its various predictive implications.

Explication of these two crucial aspects of curricular claim validation is provided in the succeeding sections. First, we will consider *a priori* aspects of curricular claim validation; second, we will consider *a posteriori* aspects of curricular claim validation. *A priori* refers to those aspects of validation conducted prior to the decision as to whether predictive tests of factual validity are warranted. *A posteriori* refers to those aspects of validation conducted consequent to such a decision (assuming that decision is favorable to the curricular claim).

A Priori Aspects of Curricular Claim Validation

Three different kinds of judgments should be made prior to the decision as to whether a proposed curricular claim

merits empirical trial. First, judgments must be made as to whether the curricular claim has adequate meaning. Second, judgments must be made as to the systemic import* of the curricular claim. Third, judgments must be made as to the potential factual validity of the curricular claim. All of these judgments are reducible to judgments of logical validity or judgments of factual validity of sentences.

Judgments of Meaning

Unless one is willing to expend his energies conducting empirical tests of any claim whatever, even those that are incapable of interpretable empirical test, then there must exist some warranted conditions by which claims capable of interpretable empirical test can be differentiated from claims that are not capable of interpretable empirical test.

The conditions of interpretable empirical test are, in fact, conditions of adequate meaning. These conditions include considerations of (a) the form of the claim, (b) the internal consistency of the various extra-logical components, and (c) the possibility of instantiation of the extra-logical components.

The judgments to be made in reference to each of the foregoing considerations are, in fact, judgments that must be made on logical grounds alone. Moreover, as has already been noted, we are framing conditions of adequate meaning. Consequently, we will use the label *logical conditions of an adequate*

* *The notion of 'systemic import' is borrowed from Carl Hempel's concept of 'systematic import of scientific concepts'* ([8], pp. 91-97), *and liberally adapted to fit our own perspectives of system in education.*

curricular claim to denote the following requirements:

C[1]: The claim is synonomous with some sentence of the form:

For each pupil X, where X fulfills conditions C; If both the teacher(s) and a set of pupils of which X is a member, act under rules R, then X will (probably) attain goal-state S.

C[2]: The set of statements which constitutes each extra-logical component of the claim (i.e. *curricular goal-state*, *curricular rules*, and *curricular qualifying conditions*) is characterized by logical consistency.

C[3]: The set of statements which constitutes each extra-logical component of the claim is capable, in principle, of empirical test to determine whether its implications are realized.

Judgments of Systemic Import

Assuming that formulation, realization, and validation of curricular claims are fundamental aspects of a professional enterprise (i.e. the profession of teaching), then these actions are governed by the professional bases ([12], Part One). These professional bases include aims and functions (i.e. pragmatic base), credible concepts and principles (i.e. conceptual base), and value orientations and ethical norms (i.e. value base).

The actions of a professional are governed by the professional bases to which all members of that profession subscribe. Under this perspective, the form and substance of curricular claims, the manner of their realization, and the methods of their validation must be determined and judged in reference to the pragmatic, conceptual, and value bases of the teaching profession.

Under the foregoing premises, a curricular claim is imbedded in a comprehensive and coherent professional framework, and is systemically related to all other aspects of that framework. Therefore, a curricular claim must be judged on the basis of relations between sentences contained in the curricular claim and sentences which represent the professional bases. More specifically, the judgments of systemic import should include at least:

a. Judgment as to the validity of the curricular goal-state in reference to the educational aims to which the profession is committed.

b. Judgment as to whether the curricular rules are permissible in reference to the ethical norms of the profession.

c. Judgment, if the curricular claim is set forth as a statement belonging to a system of curricular claims, to determine whether the proposed claim is systemically related to the other curricular claims of the system.

Judgments of Potential Factual Validity

Assuming that we are governed by the conditions of rational action (that is, assuming the obligation to act rationally is imbedded within the ethical postulates of our professional value base), then two additional kinds of a priori judgments must be made. These are judgments as to whether (a) there is good reason to believe that the curricular rules, if invoked, are likely to lead to goal-state attainment, and (b) there is good reason to believe that the proposed curricular claim is likely to lead to benefits not available under existing

curricular claims.

The preceding considerations are taken into account by the following important judgments:

a. Judgment as to the potential effectiveness of the course of action, defined by the curricular rules, in relation to goal-state attainment by pupils satisfying the curricular qualifying conditions.

b. Judgment as to whether the curricular claim (or system of curricular claims) has the potential for substantive improvement of knowledge or practical benefit in comparison with established, i.e. previously validated, curricular claims (or systems of curricular claims).

A Posteriori Aspects of Curricular Claim Validation

The Logic of Testing Factual Validity

Suppose that we have formulated a particular curricular claim, including precise articulation of the various statement sets which constitute the curricular goal-state, curricular rules, and curricular qualifying conditions. Suppose also that the claim withstands all the foregoing *a priori* tests. It is then, and only then, reasonable to conduct empirical trials to determine the claim's factual validity.

Let the curricular claim to be tested be the curricular claim set forth in Figure 1 of this paper. Let us also use the symbol *C* to denote that curricular claim.

A number of things must be accomplished in order to make a justified judgment as to the factual validity of our curricular claim, *C*. (These views are borrowed from Carl G. Hempel's

Philosophy of Natural Science ([8], pp. 6-25).) These things include:

a. Identification of significant auxiliary hypotheses, A_1, A_2, A_3, ..., A_n.

b. Specification of the test implication, I, which is to be judged *factually valid*, *factually contravalid*, or *factually indeterminate* on the basis of observation sentences.

c. Formation of observation sentences on the basis of *sense-data* ([16], pp. 7-16).

d. Judgment of factual validity of the test implication, I, on the basis of its relations to the set of observation sentences.

e. Judgment of factual validity of the (more general) curricular claim, C, taken in conjunction with auxiliary hypotheses A_1, A_2, A_3, ... , A_n.

Although the curricular goal-state, curricular rules, and curricular qualifying conditions have been specified in claim C, the claim still contains variables. A particular pupil (i.e. the replacement for X), a particular set of pupils of which X is a member, and a particular teacher or set of teachers have not been specified in C. The curricular claim is sufficiently general to be tested over a wide range of particular teacher and pupil sets.

A test implication, I, or "statement describing the observable consequences to be expected," can be framed by merely plugging in particular pupil names and particular teacher names for the variables of claim C. It should be noted that our example represents the simplest of cases. The curricular claim

C might contain, in other cases, highly abstract extra-logical components, whereas the extra-logical components of I might be framed in more elementary terms.

Formation of a test implication typically demands at least tacit assumption of certain premises, or *auxiliary hypotheses*, in addition to the hypothesis being tested. In our own case, it is fruitful to make explicit some fundamental and tenuous auxiliary hypotheses, upon which derivation of the test implication I partially depends. These auxiliary hypotheses include:

A_1: Each teacher and pupil, ostensibly acting under the curricular claim, has subscribed to the conditions of the curricular claim; and, has done so of his own volition.

A_2: Each teacher's action is governed by instructional claims, as well as by curricular rules, and each instructional claim is consistent with the conditions of the curricular claim.

A_3: There is sound justification for the belief that the set of instructional claims invoked, taken in conjunction with the conditions of the curricular claim, is logically or empirically sufficient for pupil attainment of the curricular goal-state.

It should be noted that empirical checks on the validity of each of the foregoing auxiliary hypotheses may be well warranted, particularly where the expectation of a factually-valid curricular claim appears to be not supported by the evidence.

Curricular claim C and auxiliary hypotheses A_1, A_2, and A_3 now have become confounded within the intended empirical test of C. The logic of the test can be displayed in the following way ([8],pp.22-25):

If C is true, and A_1, A_2, A_3 are all true, then I is true.

I is not true [i.e. I is judged to be factually contravalid on the basis of its relations with a set of observation sentences]

C, A_1, A_2, and A_3 are not all true [i.e. they are not all factually valid]

If the test implication I is judged to be *factually contravalid* on the basis of observation sentences which are themselves assumed to be factually valid, then the inference is made that either C or some subset of the auxiliary hypotheses A_1, A_2, A_3 or both, is factually contravalid. As a practical procedure, such auxiliary hypotheses should be checked during the course of the empirical test period; first, because these hypotheses are very likely to be factually contravalid and, second, because there is no other opportunity of determining their factual validity. Grounds for rejecting curricular claim C exist only when there is assurance that each of the auxiliary hypotheses is valid, and also assurance that the observation sentences are valid.

Semantical Aspects of Judging a Test Implication

Recall that test implication I, and curricular claim C as well, specifies a relation between some course of action, defined by a set of rules and taken in reference to an individual pupil, and attainment of an intended goal-state by that individual pupil. This has important implications for the kinds of observation sentences that are relevant to a judgment of the

factual validity of test implication *I*, and consequently for a judgment of claim *C*. The judgment that *I is factually valid* is warranted only if certain semantical relations exist between *I* and the observation sentences.

To take a simple illustration, suppose the curricular goal-state were the "ability of determining the sum of any two natural numbers (i.e. 1,2,3,...)." The following empirical proposition, then, is contained within the curricular claim: "[Individual pupil] *X* will attain the ability of determining the sum of any two natural numbers." Upon replacement of the variable *X* with a particular pupil, say Tom Jones, we have the testable proposition:

> *Tom Jones will attain the ability of determining the sum of any two natural numbers.*

The observation sentence, "*Given the question 'What is the sum of 8 and 3?', Tom Jones responded '11',*" is relevant to a judgment as to the validity of the proposition. The observation sentence is relevant because of its semantical relations with the proposition. First, the subject (i.e. Tom Jones) of the observation sentence also is the subject of the proposition being tested. Second, the test conditions and response conditions described by the observation sentence fulfill the predicate concept, i.e. "determining the sum of two natural numbers," of the proposition under assessment.

On the other hand, the observation sentence, "*Given the question 'What is the sum of 8 and 3?', 70 per cent of the third*

grade class of which Tom Jones is a member, responded '11'," obviously is not relevant to a judgment as to the factual validity of the proposition being tested. The observation sentence is not relevant because its subject, "70 per cent of the third grade class of which Tom Jones is a member," is not *synonomous* with the subject of the propositions being tested, namely "Tom Jones." The semantical relation required for relevance, in this case, is a *synonymity relation.*

A Note on Instructional Claim Validation

Although instructional claim validation will not be included within the scope of the present paper, a brief note may be in order.

The method of validating an instructional claim is essentially the same as that of validating a curricular claim. There are some puzzling aspects of instructional claim validation, however, that will not be considered in this paper. A swift overview of the more obvious aspects of instructional claim validation is presented in the following paragraphs.

First, the instructional claim must satisfy certain logical conditions of adequacy to assure that the claim has sensible meaning. These conditions should entail judgments as to (a) form, (b) internal coherence, and (c) whether the claim is capable of empirical test.

Second, an instructional claim should relate in particular ways to other aspects of the conceptual system of which it is a

component. The relations to be examined and judged include (a) relations between the instructional claim and other instructional claims formulated under the same set of curricular claims, (b) relations between the instructional claim and the governing curricular claims, (c) relations between the instructional claim and the aims, logical and empirical principles, and ethical norms of the profession, and (d) relations between the instructional claim and credible principles of the relevant theoretical or technological foundations.

Third, an instructional claim is an hypothesis, and demands empirical test. The principles governing empirical test of curricular claims apply to factual validation of instructional claims as well.

Since practical situations are likely to change quite rapidly, judgments as to the factual validity of an instructional are likely to be tenuous ones. This does not imply that such judgments should not be made, nor that the foregoing principles of validation do not apply. However, one should temper the confidence in his judgments according to the circumstances under which the judgments are made.

IMPLICATIONS

It will be illuminating to view the various implications of the concepts and principles introduced in this paper. These implications will be explicated in reference to (1) curricular and instructional research, and (2) educational program formation and evaluation.

Implications for Curricular and Instructional Research

The constructions of this paper are tantamount to a reconstruction of the very foundations of curricular and instructional research. Significant aspects of the reconstructed framework include:

(a) the concepts of curricular claim and instructional claim, and the relationship between those concepts;

(b) the concepts of logical validity and factual validity*;

(c) logical conditions of an adequate curricular claim (it was implicitly assumed that parallel conditions of adequacy apply to instructional claims);

(d) methods of logical validation of a curricular claim in reference to the pragmatic, conceptual, and value bases of the profession, and in reference to other systemically related curricular claims (with the implicit assumption that similar judgments should be made in reference to instructional claim validation);

* *As has been noted previously, these concepts have been borrowed directly from the language of science; particular sources have been cited.*

(e) methods of factual validation of a curricular claim in a manner governed by the logic of scientific hypothesis testing; and, where this entails taking into account:

(1) significant auxiliary hypotheses, and

(2) the semantical relations that must exist between a test implication and the observation sentences used as bases for its judgment.

Researchers who subscribe to the conceptual framework in which these enumerated aspects are imbedded will perceive their problem domain and go about their inquiries in quite different ways than heretofore. Adherents to the new perspectives will (a) frame their hypotheses differently, (b) demand that their curricular and instructional hypotheses be systemically related within a professional context to which they have deliberately subscribed and under which their formulations are justified, and (c) show little interest in isolated hypotheses devoid of well-defined extra-hypothesis context.

The ways of evaluation of these adherents to the new perspectives will include (a) judgments of logical coherence both within and between hypotheses, (b) judgments as to the logical forms of their curricular and instructional structures, e.g. to determine whether they might be tautological or incapable of meaningful empirical test for some other reasons, (c) judgments as to the potential contribution of a newly proposed hypothesis or system by comparison with established ones,

and (d) empirical test under new and extended standards.

Since the reconstructed conceptual framework provides an implicit set of criteria for distinguishing relevant from non-relevant problems, attention will be focused on significantly different kinds of curricular and instructional problems.

For example, the formation and test of curricular claims whose qualifying conditions are specified may be relevant; curricular claims that ignore qualifying conditions are not relevant. Systematic development of complex systems of curricular claims and instructional claims is relevant; formation and test of isolated instructional claims is not relevant. Empirical test of a curricular claim that meets the logical conditions of adequacy may be considered; empirical test of a claim not satisfying these conditions of adequacy cannot be conducted.

Conceptual investigation into rule structures and the logic of teaching action is relevant and significant. Conceptual investigation in reference to formation of abstract models for systems of curricular and instructional claims is important. Inquiry into the logical aspects of goal-state representation is desirable.

Since curricular and instructional claims are framed in reference to the aims and functions, value orientations and ethical norms, and fundamental conceptual structures of the

education profession, these professional bases in turn impose constraints on the form and substance of the claims. Advancement of curricular and instructional research, consequently, is dependent in part on precise articulation of fundamental aspects of the professional bases, and on substantive investments toward their continuing development.

Implications for Educational Program Formulation and Evaluation

Under the reconstructed conceptual framework, an educational program is appropriately construed as a system of curricular claims. This view entails deliberate construction of qualifying conditions, goal-states, and sets of content and process rules. The various claims must satisfy the logical conditions of adequacy; this has the effect of demanding much greater precision, coherence, and comprehensiveness than ordinarily characterizes educational program planning. Moreover, the relations among the various curricular claims must be well-defined (and justified as well). It is likely that the claims will sometimes be cast as elements of a hierarchical structure, but this is not a necessity.

Evaluation of an educational program, then, is construed as validation of curricular claims, and must be conducted under the principles of curricular claim validation previously delineated.

As in any hypothesis testing, meaningful empirical test will entail precise articulation of significant auxiliary hypotheses, and these must be validated as well as the curricular claims.

Concluding Statement

We have introduced the concepts of curricular claim and instructional claim, and outlined fundamental validation principles. The conceptual framework set forth applies equally well to both practical educational program construction and evaluation and curricular/instructional research.

Under these perspectives, researchers and teachers speak the same language, are concerned with building the same sorts of structures, and utilize common principles in their evaluations. Although it has not been mentioned previously, these same principles apply also to evaluation of pupil performance. If these assertions are valid, a highly significant simplification of the world of education has been achieved. This simplification has been accomplished merely by utilizing a more fundamental language, to which the formerly disconnected aspects of the educational enterprise are reducible.

The concepts and principles presented here, in conjunction with the extended educational paradigm in which they are imbedded [11], represent a significantly different perspective

of both curricular/instructional research and teaching practice. It entails quite different ways of planning, different criteria of evaluation, different judgments as to what problems are relevant and significant, and demands connectedness and comprehensiveness to a degree not previously possible.

Strong political, social, and educational establishment forces operate against any general realization of the perspectives outlined here, regardless of any merit they may have. Nevertheless, it is believed that these perspectives will prove fertile and challenging to some of the most able and critical educationists and non-educationists.

It is possible that, in time, a distinct professional sector may develop under such a conceptual framework. If such an event were to occur, it is believed that the magnitude and importance of its advances would be startling.

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* *This bibliography consists primarily of sources cited in the text of the paper. It also contains a few references that have had important influence on the author's perspectives, but which have not been utilized in a direct way.*

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